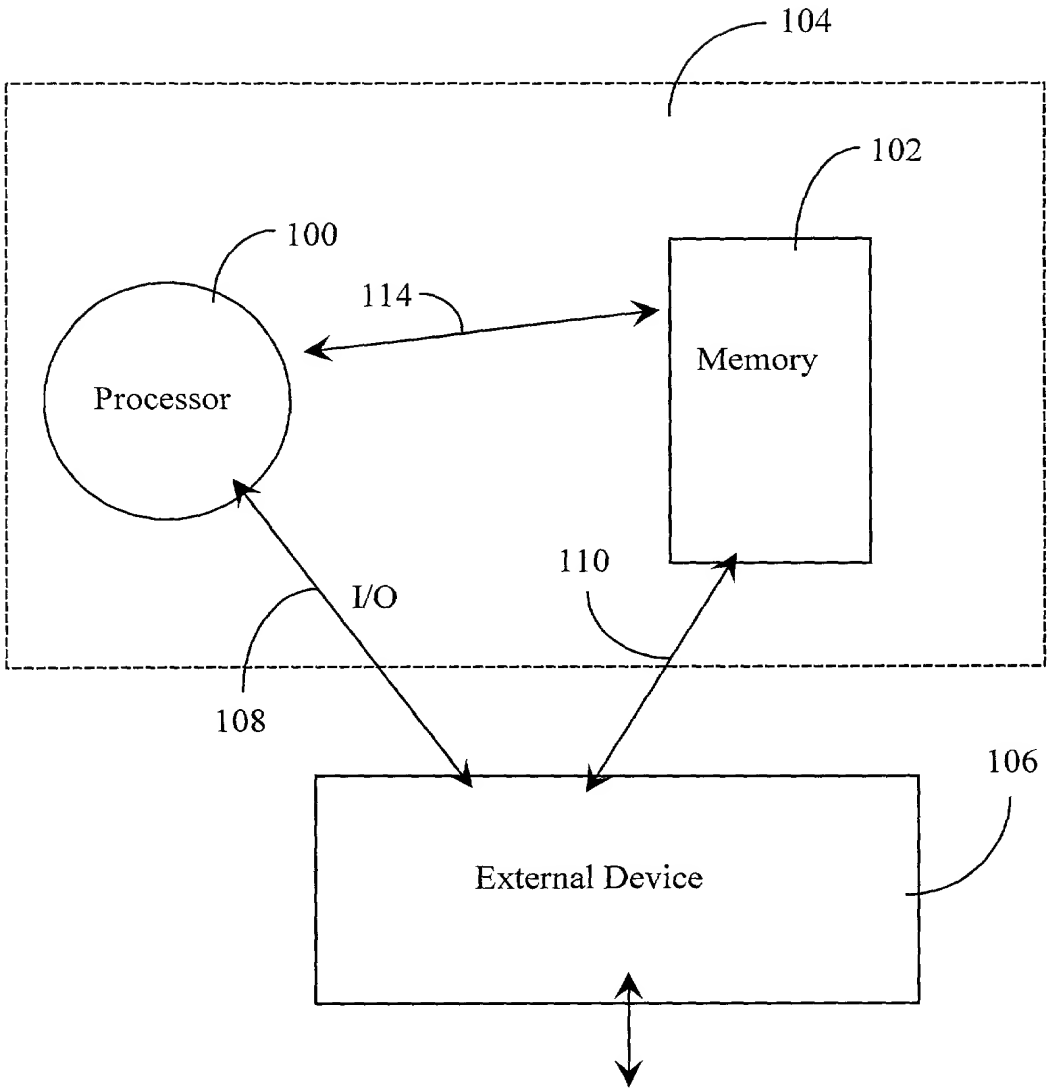

Fig. 1 (Prior Art)

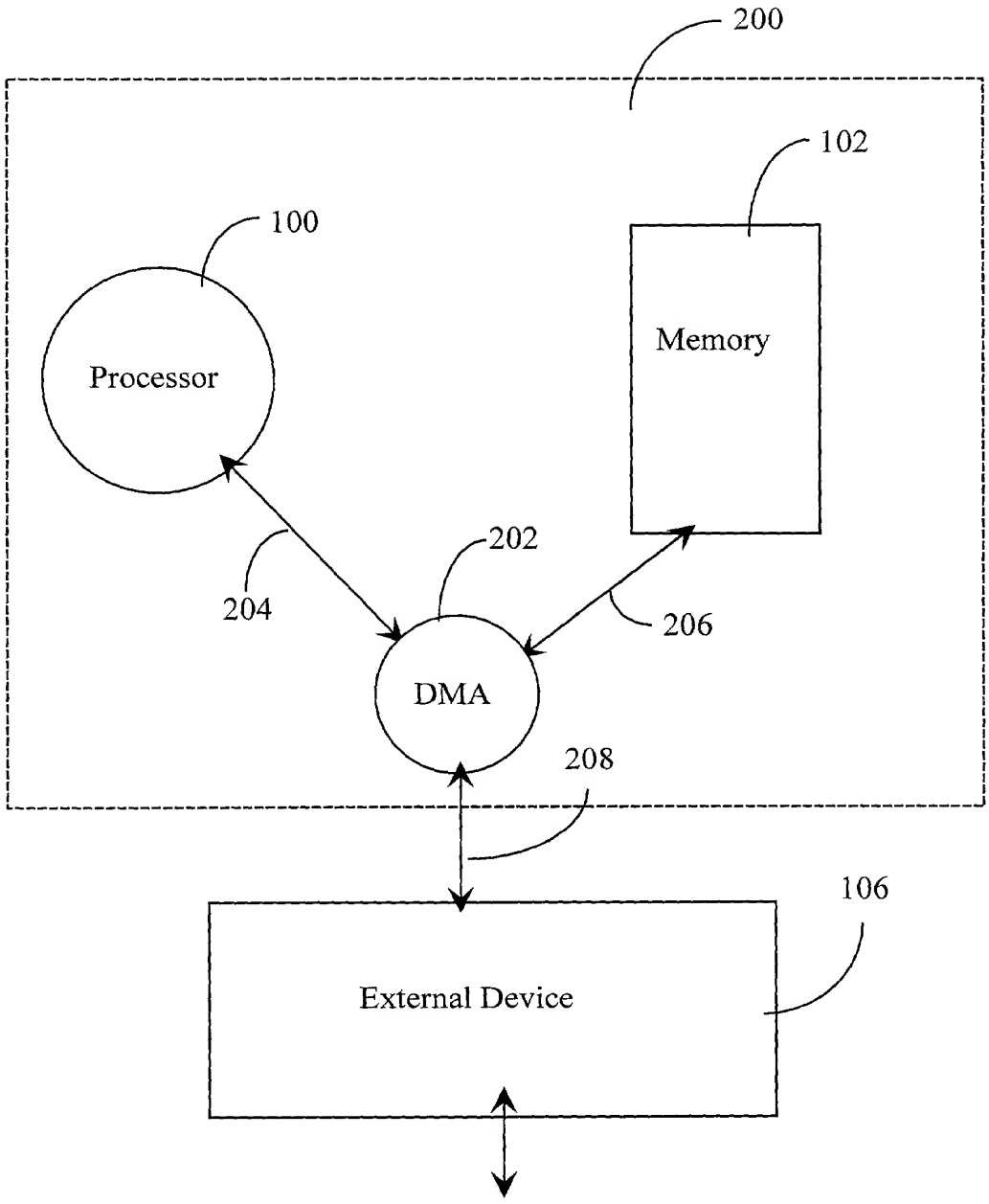

Fig. 2 (Prior Art)

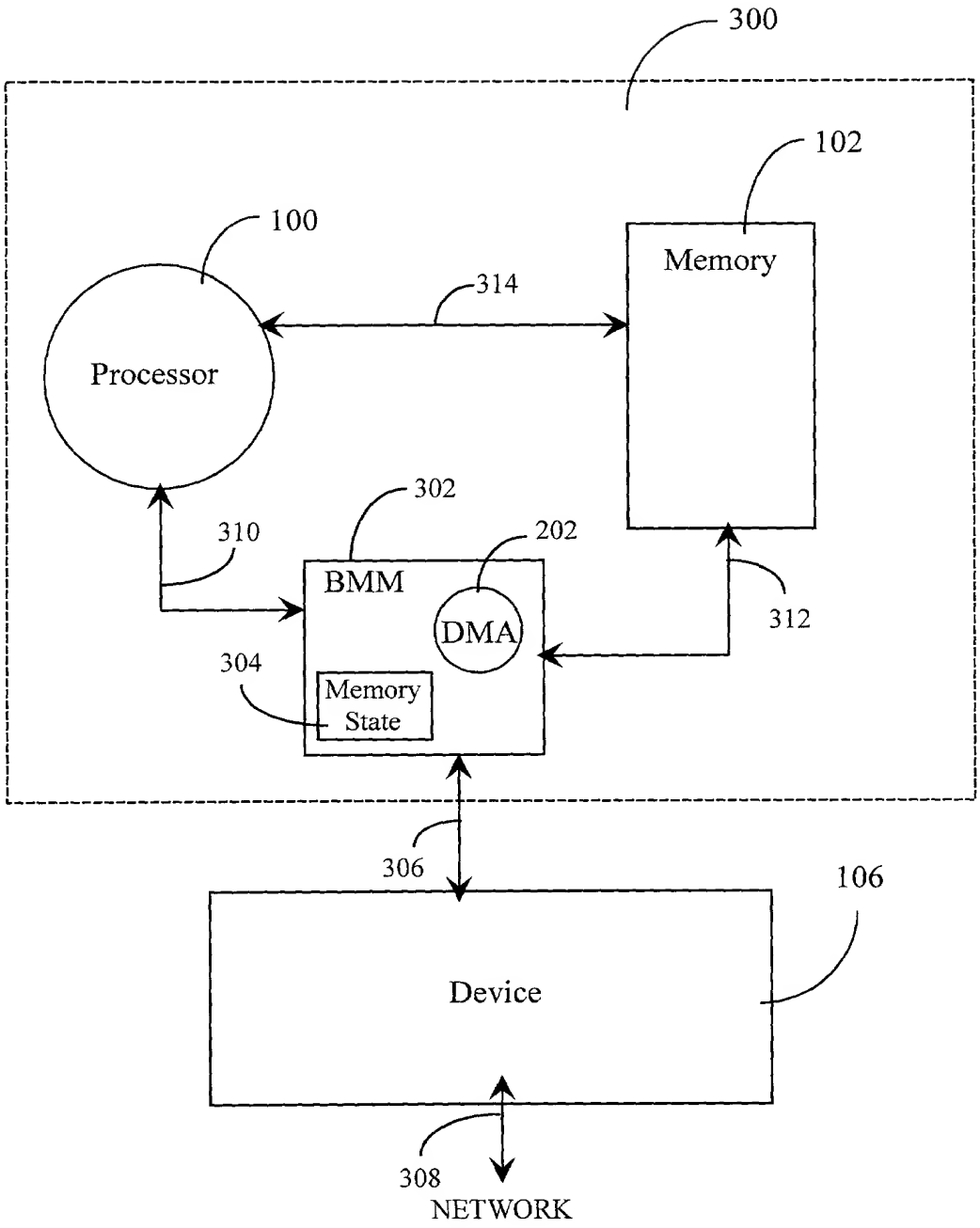
300
102
100
Memory
314
Processor
302
310
202
BMM
DMA
312
304
Memory
State
306
106
Device
308
NETWORK

Fig. 3

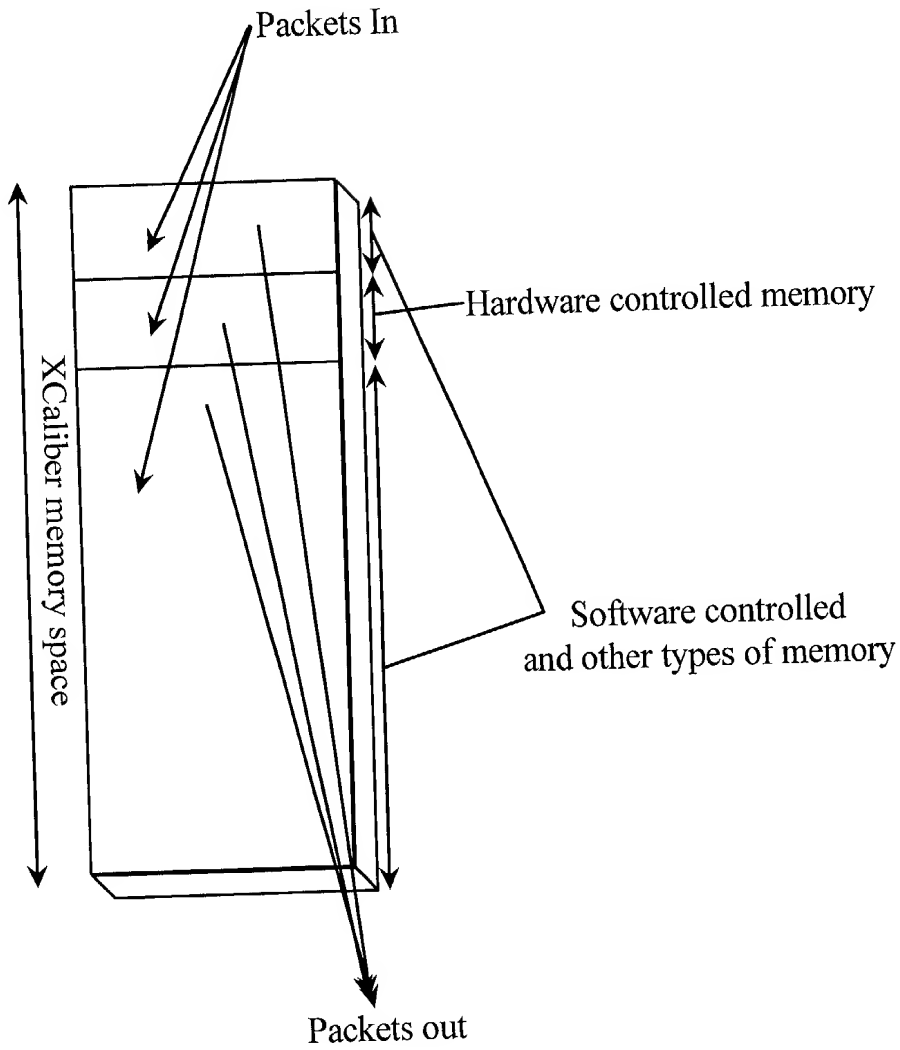
Packets In
Hardware controlled memory
XCaliber memory space
Software controlled
and other types of memory
Packets out

Fig. 4

64KB VP
0
32KB VP
0
1
Atomic Pages
2KB VP
0
31
1KB VP
0
1
62
63
512B VP
0
1
2
127
256B VP
0
1
2
3
255
Virtual Pages
256 BYTES
64KB block of the hardware controlled memory

Fig. 5

Allocation algorithm implementation

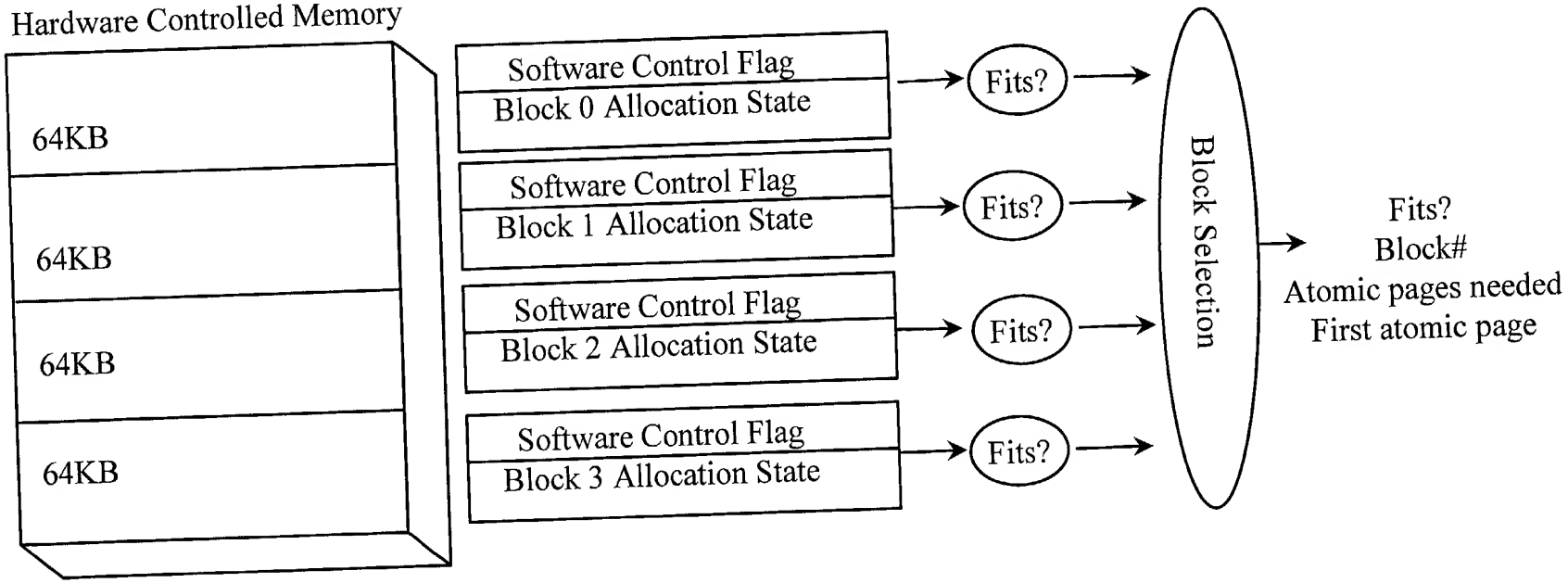

Fig. 6a

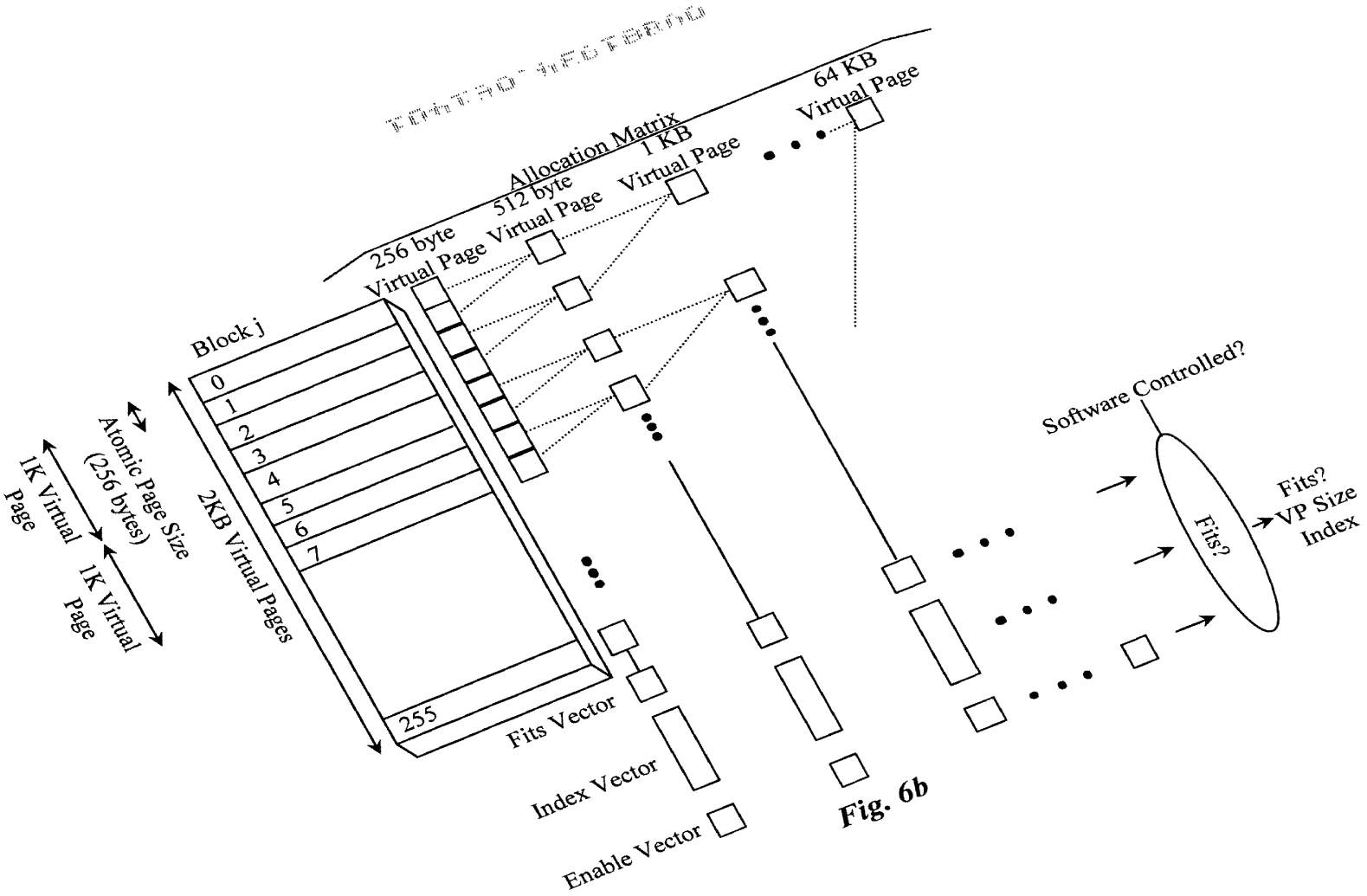
Allocation Matrix
64 KB Virtual Page
1 KB Virtual Page
512 byte Virtual Page
256 byte Virtual Page
Block j
0
1
2
3
4
5
6
7
255
2KB Virtual Pages
Atomic Page Size (256 bytes)
1K Virtual Page
1K Virtual Page
Fits Vector
Index Vector
Enable Vector
Software Controlled?
Fits?
Fits?
VP Size Index

Fig. 6b

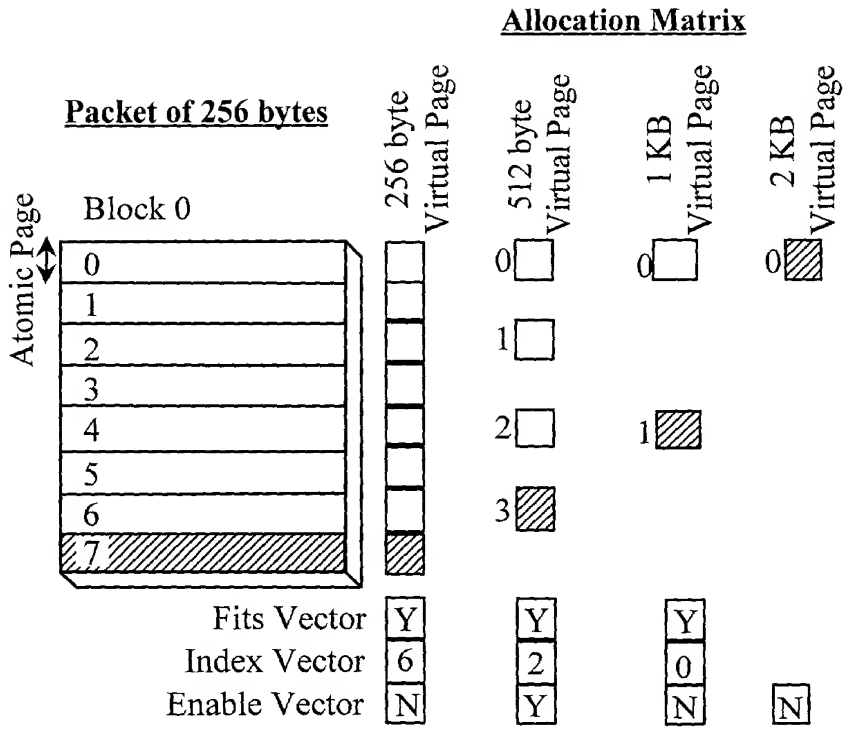
Allocation Matrix
Packet of 256 bytes
Block 0
Atomic Page
0
1
2
3
4
5
6
7
256 byte Virtual Page
512 byte Virtual Page
1 KB Virtual Page
2 KB Virtual Page
Fits Vector
Index Vector
Enable Vector
Y
6
N
Y
2
Y
Y
0
N
N

Fig. 7a

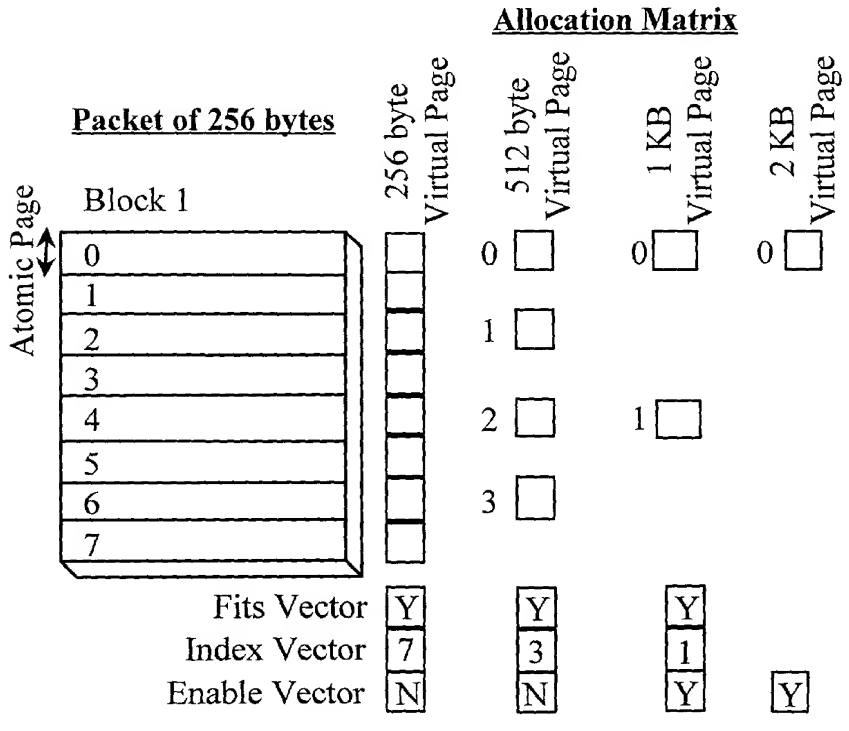
Allocation Matrix
Packet of 256 bytes
Block 1
Atomic Page
0
1
2
3
4
5
6
7
256 byte Virtual Page
512 byte Virtual Page
1 KB Virtual Page
2 KB Virtual Page
Fits Vector
Index Vector
Enable Vector
Y
7
N
Y
3
N
Y
1
Y
Y

Fig. 7b

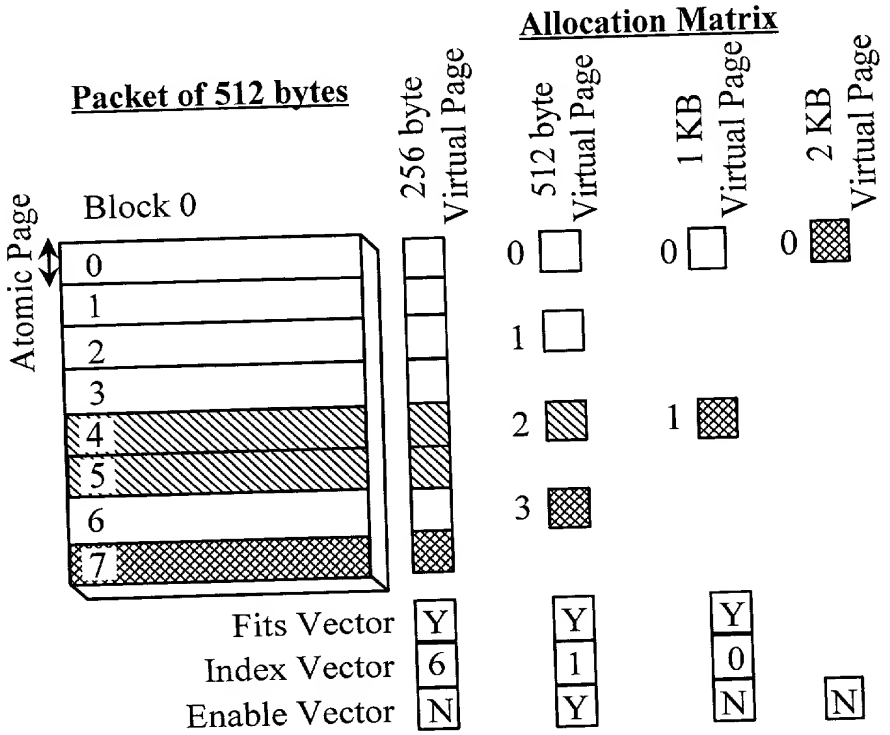
Allocation Matrix
Packet of 512 bytes
Block 0
Atomic Page
0
1
2
3
4
5
6
7
256 byte Virtual Page
512 byte Virtual Page
1 KB Virtual Page
2 KB Virtual Page
0
1
2
3
0
1
0
1
Fits Vector
Index Vector
Enable Vector
Y
6
N
Y
1
Y
Y
0
N
N

Fig. 7c

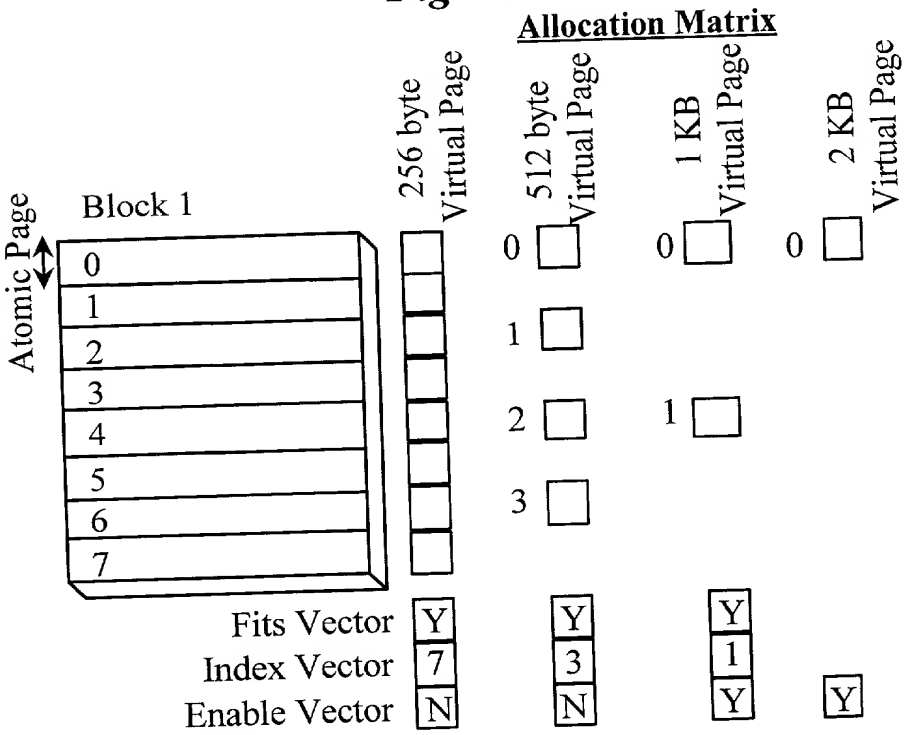
Allocation Matrix
Block 1
Atomic Page
0
1
2
3
4
5
6
7
256 byte Virtual Page
512 byte Virtual Page
1 KB Virtual Page
2 KB Virtual Page
0
1
2
3
0
1
0
1
Fits Vector
Index Vector
Enable Vector
Y
7
N
Y
3
N
Y
1
Y
Y

Fig. 7d

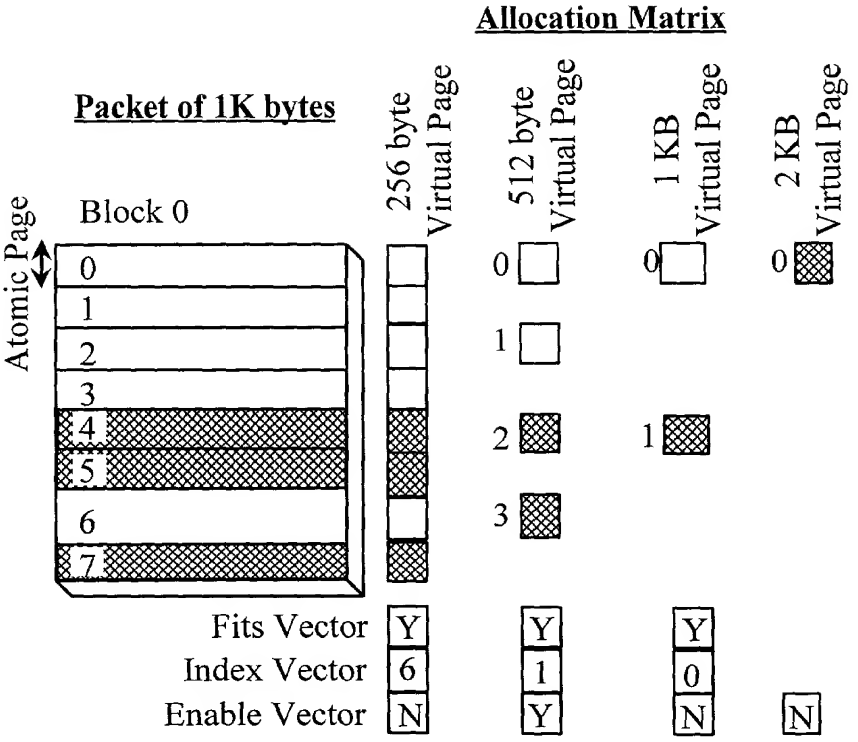
Allocation Matrix
Packet of 1K bytes
Block 0
Atomic Page
256 byte Virtual Page
512 byte Virtual Page
1 KB Virtual Page
2 KB Virtual Page
0
1
2
3
4
5
6
7
Fits Vector
Index Vector
Enable Vector
Y
6
N
Y
1
Y
Y
0
N
N

Fig. 8a

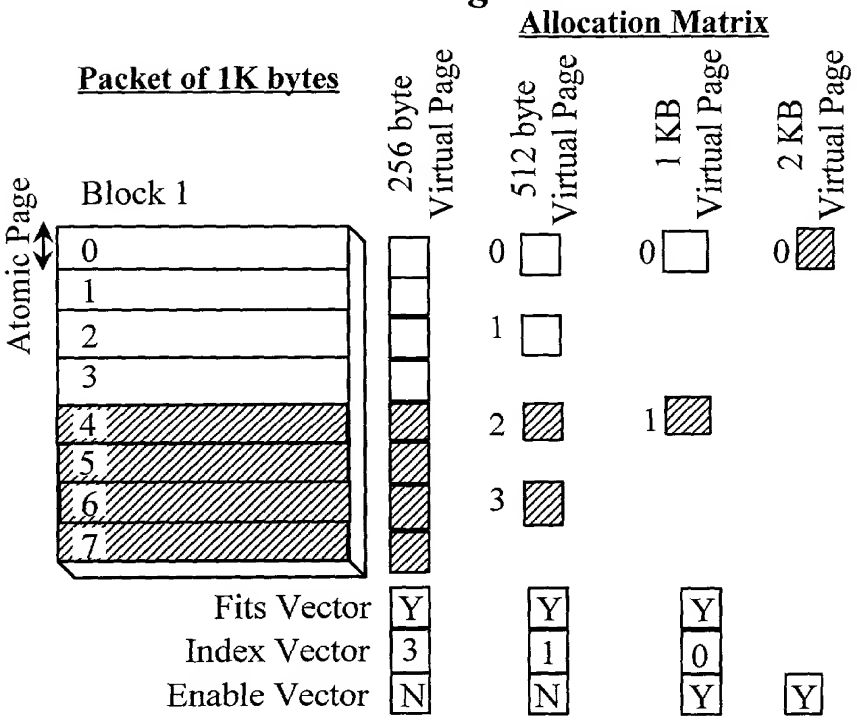
Allocation Matrix
Packet of 1K bytes
Block 1
Atomic Page
256 byte Virtual Page
512 byte Virtual Page
1 KB Virtual Page
2 KB Virtual Page
0
1
2
3
4
5
6
7
Fits Vector
Index Vector
Enable Vector
Y
3
N
Y
1
N
Y
0
Y
Y

Fig. 8b

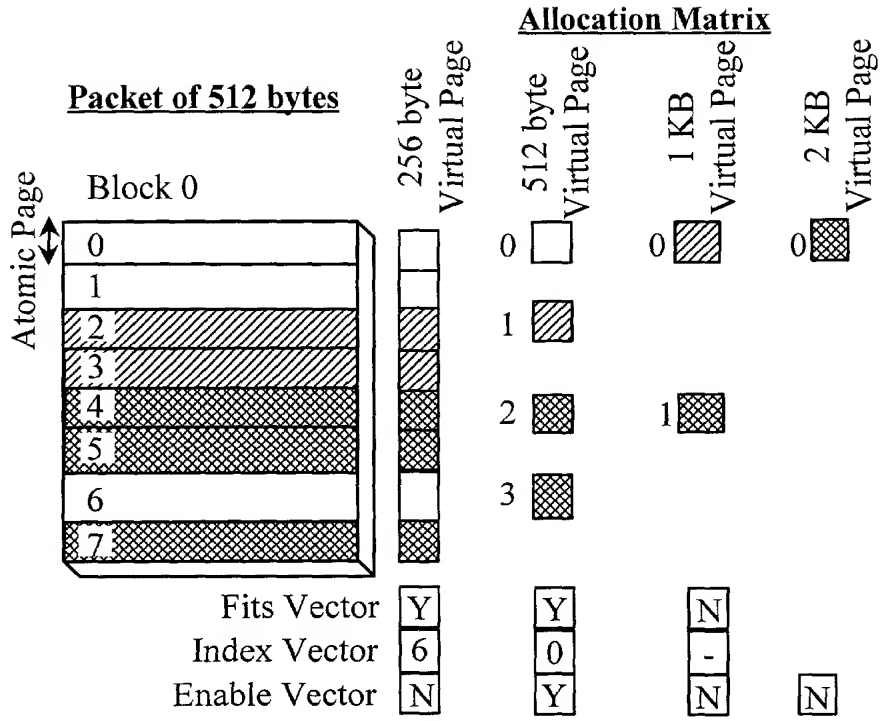
Allocation Matrix
Packet of 512 bytes
Block 0
Atomic Page
0
1
2
3
4
5
6
7
256 byte Virtual Page
512 byte Virtual Page
1 KB Virtual Page
2 KB Virtual Page
0
1
2
3
0
1
0
Fits Vector
Index Vector
Enable Vector
Y
6
N
Y
0
Y
N
-
N
N

Fig. 8c

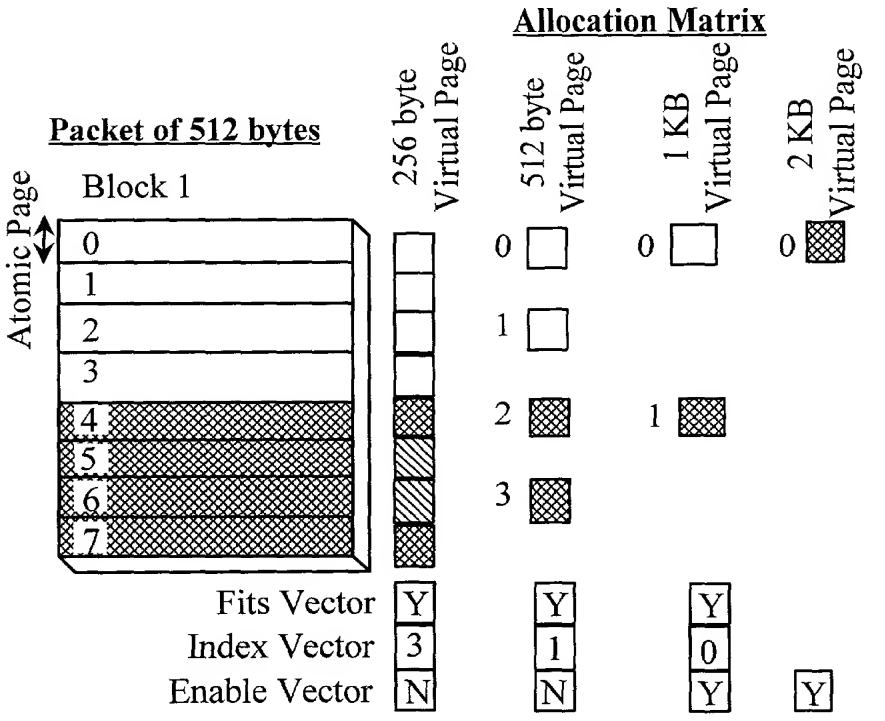
Allocation Matrix
Packet of 512 bytes
Block 1
Atomic Page
0
1
2
3
4
5
6
7
256 byte Virtual Page
512 byte Virtual Page
1 KB Virtual Page
2 KB Virtual Page
0
1
2
3
0
1
0
Fits Vector
Index Vector
Enable Vector
Y
3
N
Y
1
N
Y
0
Y
Y

Fig. 8d

SCENARIO B
Allocation Matrix
2 KB
Virtual Page
1 KB
Virtual Page
512 byte
Virtual Page
256 byte
Virtual Page
Atomic Page
SCENARIO A
Allocation Matrix
2 KB
Virtual Page
1 KB
Virtual Page
512 byte
Virtual Page
256 byte
Virtual Page
Atomic Page

Fig. 9